PACIFIC SOUTHWEST
Forest and Range
Experiment Station

FOREST SERVICE
U.S.DEPARTMENT OF AGRICULTURE
P.O. BOX 245, BERKELEY, CALIFORNIA 94701

ROADSIDE FIRE PREVENTION SIGNS...
a restudy of their effectiveness

LIBRARY FILE COPY

William S. Folkman

USDA Forest Service
Research Note PSW-282
1973

Abstract: The effectiveness of roadside fire prevention signs after 6 years' exposure was compared with that of the same signs when they were first seen by forest motorists. The five signs were posted about a mile apart along a county road to Butte Meadows, Lassen National Forest, northern California. A sample of motorists were interviewed for their reactions to the signs. Signs were compared for their impact value—attracting the attention of motorists—and for their recall value—causing motorists to remember the signs' messages. After 6-years' exposure, the signs did not appear to be losing their effectiveness in both impact and recall values.

Oxford: 431.1(075).
Retrieval Terms: fire prevention programs; signing; roadside signs; effectiveness; research replication; Lassen National Forest.

Public and private fire protection agencies spend a considerable amount of time and money in producing and displaying roadside signs as part of their fire prevention campaigns. How effective are such signs in influencing the behavior of forest-using publics? Since the early 1960's, the Pacific Southwest Forest and Range Experiment Station has been investigating the problem. Some of the work has been done in collaboration with the University of Southern California and with the California Division of Forestry.

The first study concentrated on defining the problems in conditioning human behavior through signs, and on developing techniques for measuring the responses associated with commonly used fire prevention signs.[1] In subsequent work, some of the laboratory findings were tested in a field situation, and standard and new designs were compared for effectiveness.[2] In general, the new signs proved superior to the old ones. Brevity of message (not over three words long) or symbolism, along with color, design, and novelty characterized the successfully identified signs.

All of the early studies showed great differences among individual signs in their ability to attract attention and to convey a fire prevention message. But how stable is this effect? Is the superiority of an effective sign due to its newness or novelty—characteristics that would soon be dissipated after repeated exposures?

To answer such questions, I did a restudy of fire prevention signs, using signs previously tested on the Lassen National Forest, in northern California. Their effectiveness after 6 years' exposure was compared to that of signs when they were first seen by forest motorists. The signs were compared for their ability to attract the attention of motorists on a typical forest road, and to cause the motorist to remember the sign's message. The results suggest that signs tested did not appear to diminish in effectiveness

1

2

3

4

5

6

7

8

9

10

Figure 1—The five fire prevention signs used in the 1971 test on the Lassen National Forest, California, were Nos. 1, 6, 8, 9, and 10.

after long exposure. This finding was contrary to the hypothesis that such exposure would reduce the novelty of the new signs—the quality to which some attributed the success of the signs in the original study. This is not to say that overexposure will not ultimately lessen the effectiveness of a sign. But it does suggest that fire prevention workers should not rely too heavily on subjective impressions in projecting how their audience will respond.

METHODS

The specific aim of the study was to determine the effect continued exposure of previously determined effective signs would have on their impact and recall value. This study, as did earlier studies, defined *impact* as the attention-attracting quality of a sign and *recall* as the quality of a sign which results in its message being remembered. These qualities are present to some degree in all signs and are importantly related to their effectiveness. The recall value of a sign, of course, is highly influenced by its impact value. A sign that is unseen can have only a questionable, subliminal influence on the subject's recollection of its message and his consequent behavior.

This study repeated the methods used in an earlier study[2] in which fire prevention signing along a segment of forest road was experimentally modified. The reactions of forest motorists to the changes were determined by stopping drivers at an interview station and administering a short questionnaire regarding their reaction to the signs. In each instance, only the driver of the vehicle was interviewed.

Two interviewers took turns manning the station. They completed 617 interviews for the present study. The interviewers could handle all of the traffic using the road except during peak periods on weekends. To avoid delaying motorists unduly, motorists were permitted to pass on through without interruption to their journey when the interviewers were occupied in interviewing other motorists. Those who had been interviewed earlier were also permitted to proceed without interruption on subsequent trips. The resulting sample of motorists is thus overrepresented by weekday travelers, and frequent users of the road were more apt to be interviewed early in the study period.

The segment of road used in the study was the same as the one used in the original study: the county road to Butte Meadows that turns off from State Highway 32, on the Lassen National Forest, in northern California. Use of the road is confined, essentially, to those who are traveling to the Forest for recreational or occupational purposes—the audience for whom the signs are intended.

The three signs found to be most effective in the original study, modified to incorporate the same colors (white on red background), size (36 inches diameter), and shape (circular), had been posted along this road each summer since 1965. The signs were repainted each season. In the present study, these three signs, (Nos. 1, 6, and 8) plus one new sign (No. 10) and one traditional Forest Service sign (No. 9) were posted *(fig. 1)*. A fifteen-day study period (August 4-18) allowed each sign to be exposed three times at each position.

The location of a sign with regard to road aspect, background, and other characteristics of the environment undoubtedly influence the effectiveness of a sign. These factors were considered in deciding where to post the five signs used in this study. The signs were spaced about 1 mile apart, their precise locations being influenced by consideration of these factors. The signs were moved each day according to a set pattern so that each one occupied each of the locations three times. As this design did not make allowance for differences in exposure on high-use days (weekends), I analyzed the number of observations of all signs, by sign position, to determine the effect such differences may have had on the showing of individual signs.

RESULTS

This follow-up study shows that the signs have retained their effectiveness very well after a period of 6 years' exposure. It had been hypothesized that familiarity, through repeated exposure, would reduce the signs value. With the revised color combinations and form (white lettering on red background and circular shape), the signs appeared to be even more effective than before: nearly 97 percent of the motorists interviewed recalled being aware of them; in contrast, about 85 percent of the respondents in the original study said they noticed the new signs, and 70 percent said they recalled seeing the old signs. The subject matter of the signs noticed was also more frequently identified with fire prevention in the present study *(table 1)*.

The first questions in the interviews gave no intimation that fire prevention was the subject of the study. In a subsequent question, the motorists were reminded that several signs dealing with fire prevention were displayed. And they were asked to recall the *one* sign that stood out in their minds. Sign 8 ("Put it Out") was, as in 1964, still by far the most frequently recalled sign *(table 2)*. Sign 10 ("Drown Fires")—a sign never before displayed in the area—ranked second in recall. As the relative position of a

Table 1–*Respondents who reported*[1] *having seen or not having seen roadside signs along Butte Meadow road, Lassen National Forest, California, by subject matter, 1964 and 1971*

Subject matter	1971 (n=617)[2]	1964 New signs (n=628)[2]	1964 Old signs (n=569)[2]
		– Percent –	
Saw signs			
Fire prevention	72.1	41.7	26.3
Fire prevention and others	20.9	26.3	19.5
Other subjects only	.6	13.5	19.3
Subject not recalled	.2	1.4	2.2
Not reported	3.1	1.7	0
Total	96.9	84.6	70.3
Did not see signs			
None observed	3.1	15.4	29.7
Total	100.0	100.0	100.0

[1]In response to questions: After you turned off State Highway 32 on your drive up here today, did you notice any signs along this road? If so, what were these signs concerned with?

[2]n = number of interviews.

Table 2–*Respondents who cited*[1] *specific roadside signs as outstanding, Butte Meadows, Lassen National Forest, 1964 and 1971*

Response	1971 (n=617)[2]	1964 New signs (n=628)[2]	1964 Old signs (n=569)[2]
		Percent	
Sign 1 ("Careful with fire")	4.5	–	12.6
Sign 6 ("Fire area")	11.0	16.4	–
Sign 8 ("Put it out")	40.9	45.3	–
Sign 9 ("Preventing fires . . .")	2.3	–	10.2
Sign 10 ("Drown fires")	26.7	–	–
Other signs[3]	–	14.0	18.8
Sign not displayed	2.6	5.7	14.2
Do not remember	10.9	18.0	44.2
Not reported	1.1	–	–
Total	100.0	100.0	100.0

[1]In response to the question: You may recall that there were several signs dealing with fire prevention. When you think back which one sign stands out in your mind?

[2]n = number of interviews.

[3]Used only in 1964 study.

specific sign is partially dependent on the group of signs with which it was displayed, one should not attempt to compare rankings of signs directly from one column to another in *table 2.* However, it is appropriate to note the differences in proportions failing to remember any signs, depending on the group of signs being displayed. Also observe that the two traditional (old) signs (Signs 1 and 9) ranked low when displayed with the new signs in 1971, compared to ranking high when they were displayed with other traditional signs in 1964.

To obtain some measure of the *recall*–message retention–value of the signs, motorists were asked to repeat the message of the sign they considered outstanding. Most of the respondents had substantial, if not verbatim, recall of the message *(table 3).*

The proportions providing verbatim responses were much higher in this study than they were in the earlier study. Perhaps some of this variance is the result of a flaw in the measurement procedure rather than a representation of the actual difference. The response to this question is subject to the subjective evaluation by the interviewer of the quality of the response. Although efforts were made to assure the same evaluation criteria in both instances, this was not completely successful. The interviewers in the present study appear to have been less discriminating in their assessment of the quality of the response than were those in the earlier study.

The relatively few motorists referring to Sign 9 ("Preventing Fire: My business, Your business, Good business") in this study were most consistent in repeating the message verbatim. It is highly likely they were repeating this rather complex message from memory of past exposures to the sign in other contexts, rather than solely from the single exposure provided in the test area.

As the next measure of recall value, the interviewers showed the motorists a card depicting color reproductions of the five signs used in the study dispersed among reproductions of five other similar signs not displayed *(fig. 1).* The respondents were requested to point out all of the signs they were sure they had seen during their drive through the test area that day. The respondents, identified on the average, 2.8 signs from among the 10 illustrated as ones they recalled having seen. In contrast, an average of 2.4 of the new signs and 1.5 of the old signs were identified in the original study as having been previously seen.

The relative ranking of the individual signs remained the same as in the other measures of recall value *(table 4).* Sign 8 ("Put it Out") and Sign 10 ("Drown Fires") were the most frequently recognized

Table 3–*Respondents who recalled message*[1] *of signs they considered outstanding, Butte Meadows, Lassen National Forest, 1964 and 1971*

Signs and year of study	Number of respondents	Verbatim recall	Substantial recall	Little or incorrect recall	No recall	Total
		Percent				
Sign 1 ("Careful with fire")						
1971	28	89.3	10.7	0.0	0.0	100.0
1964	68	47.1	36.1	12.5	8.3	100.0
Sign 4 ("Fire area"):						
1971	97	62.7	19.4	6.0	11.9	100.0
1964	103	28.1	39.8	24.3	7.8	100.0
Sign 8 ("Put it out"):						
1971	249	82.3	15.3	.0	2.4	100.0
1964	284	37.3	40.8	16.9	5.0	100.0
Sign 9 ("Preventing fires . . ."):						
1971	14	92.9	7.1	.0	.0	100.0
1964	58	31.0	39.7	20.7	8.6	100.0
Sign 10 ("Drown fires"):						
1971	165	72.1	21.8	3.0	3.0	100.0
1964	–	–	–	–	–	–

[1] In response to the question: what did this sign say specifically?

signs. Only Sign 9 ("Preventing Fires: My business, Your business, Good business"), with its traditional format, failed to be selected a higher proportion of the time than it was in the original study.

In both studies, a few individuals mistakenly reported having seen signs which were not displayed. The amount of this type of error was minimal, however, indicating that the motorists were being conscientious in their responses.

No significant difference was found in number of observations, by sign location, indicating that the sign positions selected were essentially equal in providing a setting for the signs. During the 6 years between the two studies, signs remained in the same position throughout the season, although they were rotated each year. This arrangement may have had an unmeasured effect on regular users of the road, as they may have become accustomed to seeing a particular sign in a particular location.

In considering the effectiveness of fire prevention signs, I assumed that effectiveness would be affected by individual characteristics of the viewers. Some prevention workers have suggested that those who smoke would be more apt to be aware of fire danger. Others have speculated that smokers might be more blase about fire problems. Some have reasoned that the presence of other persons in the car, especially children, would distract the driver and thus make him less likely to observe roadside signs.

In this study, age, sex, smoker–non-smoker, number of adults and children in party, and place of residence were examined with regard to their influence on sign impact or recall. None of these characteristics were significantly related to the measures of sign effectiveness, based on a Chi square test (null hypotheses of no significant difference accepted at 5 percent level of significance).

CONCLUSIONS

Neither this study nor those from which it stems attempted to deal with the very difficult, although critical, question of how much actual reduction in fire risk behavior is accomplished by posting fire prevention signs. There are no product sales by which to measure effect, as are utilized in marketing studies. The inability to control other significant variables related to fire starts (such as variations in temperature, humidity, wind velocity, topography, and fuel) and other complications seriously limits the use of statistics of actual fires as a direct measure of the effectiveness of the prevention effort. The measures employed in these signing studies are related to variations in states of awareness induced by the experimental

Table 4–*Respondents who reported*[1] *having seen specific roadside signs, Butte Meadows, Lassen National Forest, 1964 and 1971*

Response	1971 (n=617)[2]	1964	
		New signs (n=628)[2]	Old signs (n=569)[2]
	– *Percent* –		
Sign 1 ("Careful with fire")[3]	48.0	1.6	37.1
Sign 2 ("No Smoking . . .")[4]	.5	–	–
Sign 3 ("Crush smokes")[4]	.6	–	–
Sign 4 ("Protect and Enjoy . . .")	.2	.5	30.9
Sign 5 ("This . . . Not this")[4]	.5	–	–
Sign 6 ("Fire Area")[3]	66.5	58.6	1.2
Sign 7 ("America Needs Productive . . .")	.5	.2	29.5
Sign 8 ("Put it out")[3]	79.4	76.8	1.6
Sign 9 ("Preventing fires . . .")[3]	11.3	.0	27.2
Sign 10 ("Drown fires")[3,4]	71.8	–	–
None of these	2.4	4.6	21.3

[1]In response to the question: Several of these signs were displayed on this road today. Will you please tell me which ones you are sure you actually saw?

[2]n = number of interviews.

[3]Actually posted in 1971 study.

[4]Not illustrated in 1964 study.

variables–the signs. Although communications research has demonstrated that changes in cognitive and affective levels are not necessarily reflected in overt behavior, the assumption has been made that increased awareness of fire danger to some degree will have a desirable influence on fire related activity. If we accept this assumption, then it follows that for a sign to influence fire-related behavior it must be seen and a message transmitted. Signs differ a great deal in their ability to do this. This study demonstrates that this ability is not lost through repeated exposure.

NOTES

[1]Hermann, W. W., R. B. Callahan, D. E. Gray, *et al. Phase I-IV, a method for determining the semantic differential in response to varied stimuli.* Los Angeles: University of Southern California School of Public Administration. 95 p., illus. 1963.

[2]Ruckel, Gail J., and William S. Folkman. *Roadside fire prevention signs–standard and new designs compared.* U.S. Forest Serv. Res. Note PSW-65. Pacific Southwest Forest and Range Exp. Stn., Berkeley, Calif. 8 p., illus. 1965.

Folkman, William S. *Signing for the "No smoking" ordinance in southern California.* U.S. Forest Serv. Res. Note PSW-71. Pacific Southwest Forest and Range Exp. Stn., Berkeley, Calif. 8 p., illus. 1965.

The Author

WILLIAM S. FOLKMAN is responsible for the Station's research on sociological problems in the prevention of man-caused forest fires, with headquarters in Berkeley, Calif. He holds a bachelor's degree in agriculture from Utah State Agricultural College, master's degree in sociology from the University of Utah, and a doctorate in rural sociology from Cornell University. He joined the Station staff in 1962.

GPO 794–426/3744